

# Balsam Woolly Adelgid Damage to Eastern Washington and Oregon Subalpine Fir



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2<sup>nd</sup> and final year, WC-F-07-01

## Concern:

**Balsam woolly adelgid (BWA)** is an exotic, aphid-like insect that feeds only on true firs. It feeds directly through the bark on stems and tree branches, causing branch gouting, dieback and tree death.

**Subalpine fir** has suffered extensive mortality in some areas east of the Cascades but range and damage is not well understood.



Gouting: swollen branch node affected by BWA feeding.



BWA visible on bole.

## Methods:

**Three measures** were taken to characterize BWA infestation:

**BWAR rating** captures crown damage in the form of dieback and dead branches by crown third. It is an adaptation of the white pine blister rust severity rating system (Six & Newcomb 2005) and the Hawksworth (1977) dwarf mistletoe rating system. The crown of the tree on the left in this photo has extensive dieback, that on the right appears healthy.

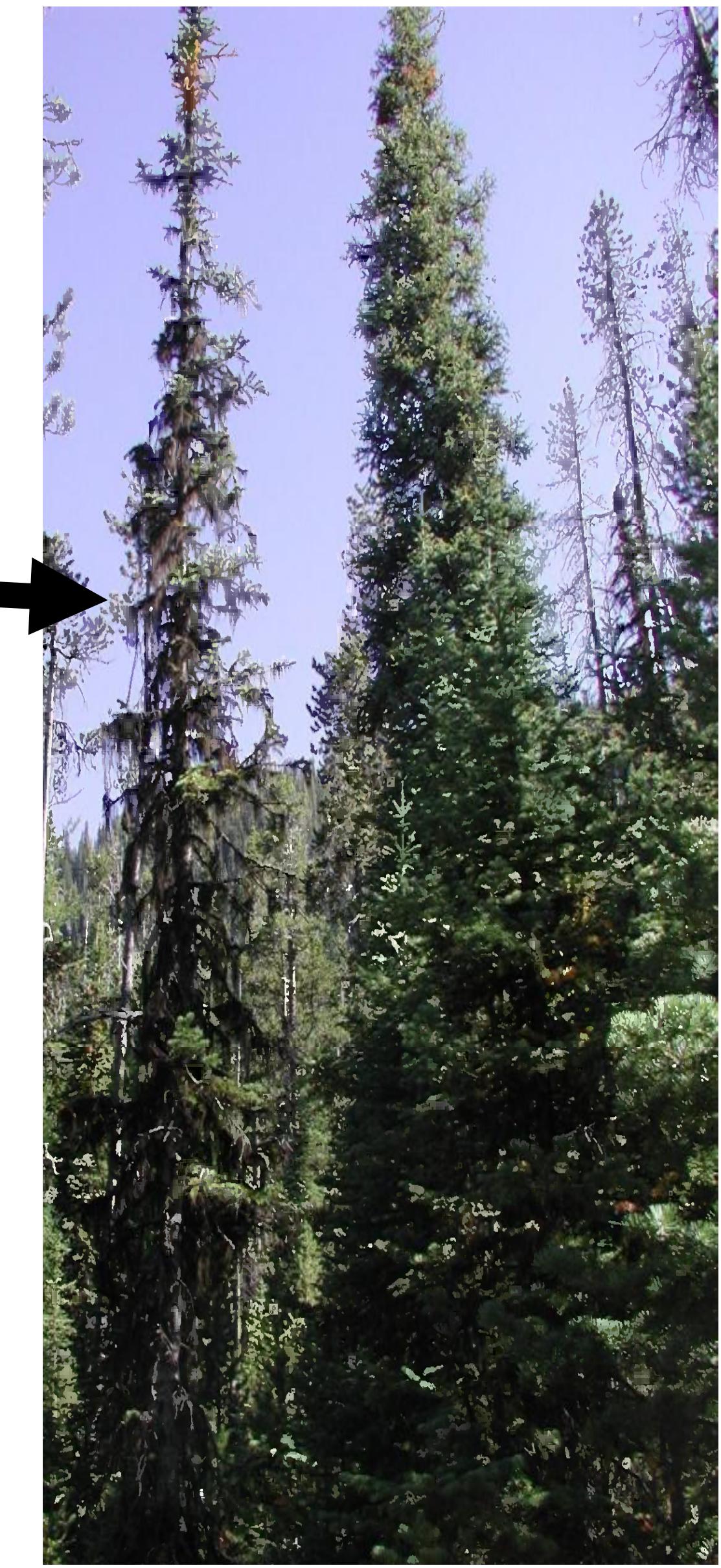
**Gouting Severity** is a measure of infestation severity evident on branches.

**Bole infestation** is an estimate of BWA density on the bole.

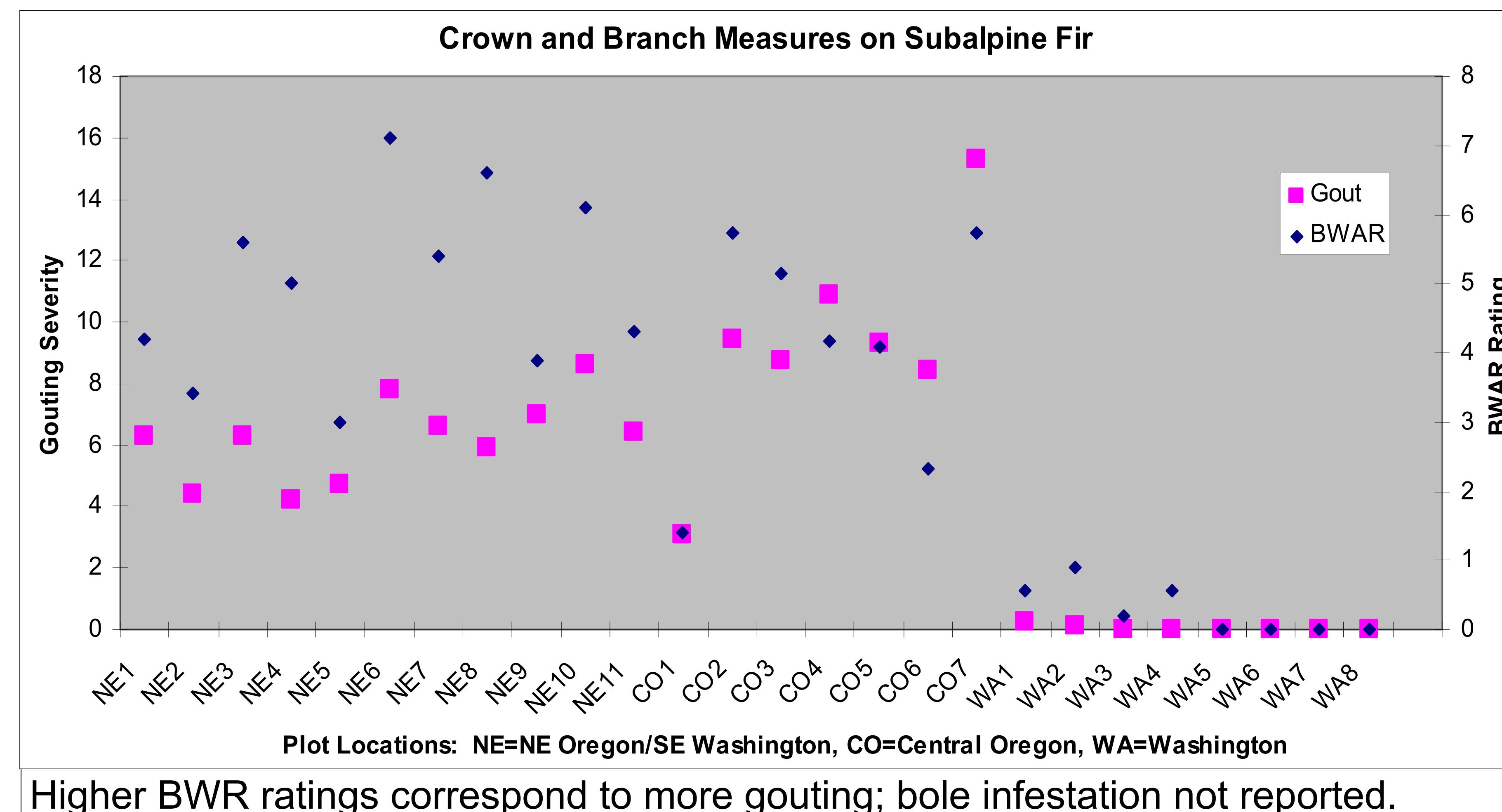
## Conclusions:

BWA was not confirmed in Northern Washington plots. Mortality was caused by a combination of Cytospora canker and *Pityokteines minutus*, which seemed to be acting as a tree killer in drought-affected stands.

The most affected stands were in NE Oregon with some at over 50% mortality. These are mixed stands and may become more dominated by spruce and lodgepole with the loss of the oldest subalpine fir.



## 2007 and 2008 Survey Plots



## References:

- Hawksworth, F.G. 1977. The 6-class dwarf mistletoe rating system. USDA Forest Service, RN-RM-48, 7p.  
Six, D. and M. Newcomb. 2005. Northwest Science 79:189-95.

## Acknowledgements:

We thank the numerous field technicians that worked on this Region-wide project over two years. Thanks also to the Forest Health Monitoring Evaluation Program for vital funding. Photos by the authors. Presented at 2009 Forest Health Monitoring Conference, Atlanta, GA 2/23-2/26.

